CLAIMS

1. A method of inspecting a structure including a photonic material using a movable inspection apparatus, the method comprising:

irradiating a section of the structure by radiation from a radiation source;

receiving, at a radiation sensor, the radiation diffracted from a photonic material in the section of the structure;

determining a deformation of the photonic material as a function of at least one of (i) an intensity of the radiation received, (ii) a position of the radiation received, and (iii) a wavelength of the radiation received; and

determining if a magnitude of the deformation is higher than a threshold;

if the magnitude of the deformation is higher than the threshold:

storing data concerning the deformation of the photonic material;

if the magnitude of the deformation is not higher than the threshold:

(i) stopping the inspection at the location of the photonic material; and

(ii) moving the inspection apparatus to inspect another section of the structure;

in which deformation is further determined as a function of a distance between the radiation source and the radiation sensor.

2. A method according to Claim 1, in which the section of the photonic material is irradiated with monochromatic radiation and the deformation is determined as a function of an intensity of the radiation received.

3. A method according to Claim 2, in which the inspection apparatus includes the radiation source and the radiation sensor, and the deformation is further determined as a function of (i) the wavelength emitted by the radiation source and (ii) a position of the radiation source with respect to the section of the structure irradiated, and (iii) a distance between the radiation source and the radiation sensor.

4. A method according to Claim 1, in which the section of the photonic material is irradiated with multi-chromatic radiation and the deformation is further determined as a function of the wavelength of the radiation received.

5. A method according to Claim 4, in which the photonic material is three-dimensional and the deformation is further determined as a function of a measured wavelength stop band.

6. A method according to Claim 4, in which the diffracted radiation is received by a camera sensor.

7. A method according to Claim 6, in which the deformation is further determined as a function of position, at the camera sensor, of the wavelength received.

8. A method according to Claim 7, in which the inspection apparatus includes the radiation source and the deformation is determined as a function of the wavelength of radiation and the position of the radiation received, in which the position of the radiation received comprises a pixel position of captured radiation at the camera sensor, in which the deformation is further determined as a function of (i) a radiation source position with respect to the section of the structure irradiated and (ii) a distance between the radiation source and the camera sensor.

9. A method according to Claim 6, in which the camera sensor includes a plurality of pixel elements that respond to received radiation by expressing a hue, and in which a wavelength of the received radiation is determined as a function of the expressed hue.

10. A method according to Claim 9, in which the wavelength is determined as a linear function of the expressed hue.

11. A method according to Claim 4, in which the multi-chromatic radiation is in the visible spectrum.

12. A method according to Claim 4, in which at least a portion of the multi-chromatic radiation is outside of the visible spectrum.

13. A computer program product comprising a non-transitory computer readable medium comprising program code which when loaded into a computer controls the computer to perform a method according to Claim 1.

14. A movable apparatus for inspecting an object including a photonic material comprising:

a radiation source for irradiating a section of the structure;

a radiation sensor for receiving radiation diffracted from a photonic material in the section of the structure;

a processor coupled to the sensor configured to determine a deformation of the photonic material as a function of at least one of (i) an intensity (ii) a position and (iii) a wavelength of the radiation received, and to determine if a magnitude of the deformation is higher than a threshold; and

a storage medium coupled to the processor;

in which if the magnitude of the deformation is higher than the threshold the processor directs data concerning the deformation of the photonic material to the storage medium; and

in which if the magnitude of the deformation is not higher than the threshold, the processor causes a stoppage of the inspection at the location of the photonic material, and transmits a signal causing the inspection apparatus to move and to inspect another section of the structure; and

in which the processor further determines deformation as a function of a distance between the radiation source and the radiation sensor.

15. An apparatus according to Claim 14, in which the radiation source emits monochromatic radiation and deformation of the photonic material is determined as a function of an intensity of the radiation received at the radiation sensor.

16. An apparatus according to Claim 14, in which the radiation source emits multi-chromatic radiation and the deformation of the photonic material is determined as a function of the wavelength of the radiation received.

17. An apparatus according to Claim 16, in which the multi-chromatic wavelength is in the visible spectrum and the radiation sensor comprises a camera sensor having a plurality of pixel elements having distinct positions.

18. An apparatus according to Claim 17, in which the processor is configured to determine deformation as a function of (i) the wavelength of radiation received, (ii) a pixel element position of captured radiation at the camera sensor, (iii) a position of the radiation source with respect to the section of the structure irradiated, and (iv) a distance between the radiation source and the camera sensor.

19. An apparatus according to Claim 18, in which the plurality of pixel elements respond to received radiation by expressing a hue, and a wavelength of the received radiation is determined as a function of the expressed hue.

20. An apparatus according to Claim 14, in which the photonic material is three-dimensional and the processor is configured to further determine deformation of the photonic material as a function of a measured wavelength stop band.

21. A method of inspecting a structure including a photonic material using a movable inspection apparatus, the method comprising:

irradiating a section of the structure by radiation from a radiation source;

receiving, at a radiation sensor, radiation diffracted from a photonic material in the section of the structure;

determining a deformation of the photonic material as a function of at least one a position and wavelength of the radiation received; and

determining if a magnitude of the deformation is higher than a threshold;

if the magnitude of the deformation is higher than the threshold:

storing data concerning the deformation of the photonic material;

if the magnitude of the deformation is not higher than the threshold:

(i) stopping the inspection at the location of the photonic material; and

(ii) moving the inspection apparatus to inspect another section of the structure;

in which the section of the photonic material is irradiated with multi-chromatic radiation and received by a camera sensor and the inspection apparatus includes the radiation source and the position of the radiation received comprises a pixel position of captured radiation at the camera sensor, in which the deformation is further determined as a function of (i) a radiation source position with respect to the section of the structure irradiated and (ii) a distance between the radiation source and the camera sensor; and in which the camera sensor includes a plurality of pixel elements that respond to received radiation by expressing a hue, and in which a wavelength of the received radiation is determined as a function of the expressed hue.